REMARKS

Claim 5 is in the application; claims 6 and 7 have been cancelled.

Reconsideration and withdrawal of the rejection of claims 5 through 7 under 35 U.S.C. 103(a) as being unpatentable over JP 57-104650 alone or in view of Umeno et al. (US 4,591,133) or Plata et al (US 5,382,306) is respectfully requested.

As discussed above

~~Claims 6 and 7 have been cancelled.~~ Remaining method claim 5 is directed to a method for manufacturing dual-phase steels of a dual-phase microstructure of 70-90 % ferrite and 30-10 % martensite from the hot-rolled state via controlled temperature guiding and defined cooling strategy. The first cooling stage is carried out in a cooling stretch of water cooling stages arranged successively at a spacing behind one another at a cooling rate of 20-30 K/s, wherein the cooling curve enters the ferrite range with still such a high temperature that ferrite formation can take place quickly, and wherein, before beginning the second cooling stage which follows without intermediate air cooling and holding time directly after the first cooling step, already at least 70 % of the austenite has been transformed into ferrite and during the transformation of the austenite into ferrite up to the

desired ferrite contents of at least 70 % the cooling of the first cooling step is continued (see 2nd to last and last paragraphs of page 3 and 1st paragraph of page 4 of the instant specification).

It is also an important feature of the method according to the invention that the second cooling step (the fast cooling step) is carried out without performing any intermediate cooling, for example, air cooling. This is explained in detail on page 5, 1st through 3rd paragraphs, of the specification.

In the introductory portion of the present invention different measures for producing dual-phase steels have been described, and it has been discussed which methods can achieve the goal of 70 % ferrite formation. The present invention provides a new method for achieving a ferrite contents of at least 70 % in a reliable way. The so-called dispersed cooling which finds use in this connection is also important in this context.

Claim 5 thus provides a clear teaching to perform cooling in the first stage such that at least 70 % ferrite is present before the second cooling stage is begun. The method according to the invention does not relate to the manufacture of dual-phase steels

with the aforementioned contents but resides in a special method in order to reliably achieve a dual-phase steel of the desired ferrite contents.

The examiner states that the abstract of Japanese reference 57-104650 discloses a method for producing a steel having a dual-phase microstructure consisting of ferrite and 1-30 % martensite by subjecting hot rolled steel to cooling at 5-30°C per second followed by a second faster cooling at > 30°C per second. The examiner furthermore points to the paragraph above table 1 where first cooling is disclosed at 20°-30°C per second followed by faster cooling at 60°C per second. The Examiner also refers to examples 4-9 in table 2 on page 274 pointing out that ferrite and 10-25 % martensite are present and that these values meet applicant's claimed microstructure. In the Response to Arguments, the examiners states that it is her position that the temperature taught by the Japanese reference will inherently process at least 70 % austenite transformation into ferrite because the end products contain over 70 % ferrite as evidenced by the end product examples 4-8 in table 2 on page 274.

JP 57-104650 prescribes to carry out the first cooling to a temperature between the Ar_1 point and 550°C, wherein the cooling speed is within a wide range of 5 to 30°C/sec. This is followed

by a second rapid cooling at $\geq$ 30°C/sec to 350-500°C.

Accordingly, the reference teaches cooling to a **specific temperature** in the first slow cooling step. In contrast to this, the present invention clearly prescribes that a particular parameter of the microstructure (ferrite contents) must have reached a certain value in the first cooling stage before the second cooling stage is begun. The cited prior art never mentions that a specific ferrite contents must be present before the second cooling step is initiated. The prior art teaching of cooling to a certain temperature cannot make obvious the claimed step of cooling to a certain ferrite contents since there is no inherent or disclosed correlation between the proposed temperature and the resulting ferrite contents of the end product. The invention proposes to carry out the first cooling step to a certain ferrite contents - this cannot be obvious in view of the ferrite contents of the prior art end product because there is no way of knowing if this ferrite contents is present at the beginning of the second cooling step. The final ferrite contents listed in the table 2 could well be the result of the second cooling step without the ferrite contents of 70 % having been reached before the second cooling step absent any disclosure to the contrary. The examiner's assertion that the ferrite contents is inherent to the process is based on the unfounded

assumption that the ferrite contents of the end products is reached after the first cooling step. The examiner focuses only on the disclosed temperature range/cooling rate disclosed in the prior art; she ignores completely the condition defined in claim 5 according to which the second cooling step should be started only once the ferrite contents has reached 70 %.

Moreover, it is questionable whether the cooling action carried out according to the Japanese reference with the temperature limits as prescribed actually realize the minimum contents of 70 % ferrite. Since in the Japanese reference only provides specific values for the martensite contents (1-30 %), it is unclear whether the remainder is actually ferrite or whether other components are present also.

It is the is position

The examiner ~~states~~ that the temperature taught by the Japanese reference would inherently produce at least 70 % austenite transformed into ferrite because the end product contains over 70 % ferrite as evidenced by end product examples 4-8 in table 2 on page 274. It is respectfully submitted that **all of the examples** in this table have been subjected to the cooling steps and cooling rates as taught by Japanese reference. Therefore, if examiner's statement that **inherently** the teachings in regard to the temperatures of the cooling actions of this

reference would result in over 70 % ferrite, **all of the examples** in table 2 would have to show a ferrite contents of more than 70 %. However, example 13 shows a martensite contents of 50 % and thus presumably a **ferrite contents (F) of 50 %**; example numeral 14 shows a martensite contents of 40 % and thus presumably a **ferrite contents (F) of 60 %**, examples 15 and 16 do not give any martensite percentages and therefore provide no indication as to the ferrite contents; example 17 shows a 40 % martensite contents and thus presumably a **ferrite contents (F) of 60 %**.

Therefore, the examiner's statement that the suggested temperature ranges and cooling rates of the prior art method **inherently** cause at least a 70 % conversion of austenite into ferrite is without merit.

As is apparent from the values of table 2 in combination with the disclosure of table 1 relating to the composition of the steel alloys tested, the steel composition and variations in percentages of the various elements contained in the steel alloy are apparently decisive in regard to the final ferrite structure of the steel alloy - not the cooling process carried out with the prescribed cooling rates and at the prescribed temperatures.

Moreover, note that the entire premise of the disclosed process is its application to a **very specific steel composition** - the method is not a generally applicable cooling method with which a certain ferrite contents can be generated for a given steel composition. Examples 11 through 19 in table 1 show compositions which are outside of the specified percentage range for the elements; these examples in particular show the ferrite contents being lower than the 70 % range.

The Japanese reference can only teach that for a specific steel alloy containing exactly the specified percentages of elements in the steel alloy <u>and</u> the specified Si/Mn percentage ratio, a martensite contents from 1 to 30 % can be achieved by performing cooling with the described parameters. See also the "Purpose" declared in the Abstract of JP 57-104650: " ... by properly controlling the hot rolling and cooling conditions of a steel having an especially regulated S content and specified relation between Si and MN.". There is no **inherent teaching** of providing at least 70 % ferrite by performing the cooling process as disclosed in the Japanese reference.

The secondary references have been applied only to show that cooling by a series of cooling sprays or adjustable cooling sprays is known. These references do not provide any teaching in

regard to the cooling parameters as claimed in claim 5.

Claim 5 is therefore not obvious on view of the Japanese reference.

Therefore, in view of the foregoing, it is submitted that this application is now in condition for allowance and such allowance is respectfully solicited.

Any additional fees or charges required at this time in connection with the application may be charged to Patent and Trademark Office Deposit Account No. 11-1835.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on July 30, 2002.

By: Friedrich Kueffner   Date: July 30, 2002